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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

TRINH, MICHAEL MANH

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 12/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No. 10/714,497	Applicant(s) WAKUI ET AL.	
	Examiner Michael Trinh	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/15/05</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

*** This office action is in response to Applicant's amendment filed September 29, 2005.

Claims 1-6 are pending.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

5. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted prior art in view of Boucher et al (6,354,909).

Applicant's admitted prior art teaches (at Figures 4, 5 S10-S22) a semiconductor device manufacturing method, comprising: a first step of forming a laminated structure by adhering, on a semiconductor substrate 10 including a plurality of integrated circuits, a carrier member 2,3 covering a region in which the plurality of integrated circuits are formed, with an insulating resin 5 interposed between the semiconductor substrate 10 and the carrier member 2,3 (Figure 5 S12); a second step of cutting on the laminated structure so as to cut the semiconductor substrate together with the insulating resin 5 while allowing at least a portion of the carrier member 2 to remain uncut (Fig 5 S14); a third step of forming metal wiring 28 on a machined surface of the laminated structure (Fig 5 S16); a fourth step of dividing the laminated structure by cutting the carrier member (Fig 5 S22); wherein the second step is performed with a dicing saw used to cut into the laminated structure including the semiconductor substrate (Figs 5 S22 and 6).

Re claim 1, Applicant's admitted prior art lacks cooling the dicing saw and a cutting portion at a temperature lower than the softening temperature of the resin. Re claim 2, cooling is executed by spraying a coolant on the dicing saw.

However, Boucher teaches (at Figures 1-2; col 14, lines 21-64) cooling the dicing saw and the cutting portion while cutting the semiconductor substrate by spraying a coolant from the nozzle 44 on the dicing saw 18, wherein the coolant temperature is less than about 50 degrees Fahrenheit (col 14, lines 53-64; 21-64) in order to improve cutting performance.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the dicing method of Applicant's admitted prior art by cooling the dicing saw used to cut into the laminated structure including the semiconductor

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substrate, as taught by Boucher, at the coolant temperature of about 50 degrees Fahrenheit or less (less than 10 degrees Celsius), which temperature is lower than the softening temperature of the insulating resin as taught by Applicant's admitted prior art. This is because of the desirability to reduce temperature of the semiconductor substrate at the cutting portion and the dicing saw, and because of the desirability to remove particles generated during cutting, and improve cutting performance, wherein the coolant temperature of about 50 degrees Fahrenheit or less (less than 10 degrees Celsius), as taught by Boucher, is very low, and lower than the softening temperature of the insulating resin as taught by Applicant's admitted prior art,

5. Claims 3,4, 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted prior art in view of Boucher et al (6,354,909), as applied to claims 1-2 above, and further of Sutherland et al (5,461,008).

The references including Applicant's admitted prior art and Boucher teach a semiconductor device manufacturing method as applied to claims 1,2 above.

Re claim 4, the references lack spraying the coolant with a spraying width larger than the width of the dicing saw; Re claim 6, with a coolant having a pH value from 4 and 6; and Re claim 3, spraying the coolant at an angle elevation of from 5 and 45 degrees.

However, re claim 4, Sutherland teaches (at Fig 2, col 2, lines 30-40; col 3, lines 1-29) spraying the coolant to the dicing saw while cutting the semiconductor substrate, wherein the coolant is sprayed with a spraying width larger than the width of the dicing saw (Figs 1-2), wherein, re claim 6, the coolant is having a pH value of about 3.5 to 5.5, preferably 4 (col 6, lines 27-35, lines 9-50). Re claim 3, Boucher teaches (at Figures 1 and 2; col 14, lines 21-45) to provide coolant streams to the cutting edges of the dicing saw, wherein the nozzles 44 for spraying the coolant, as shown in Figures 1-2, are elevated at an angle elevation of about 45 degrees. Sutherland also teaches to spray coolant to the dicing saw, wherein the coolant is spraying at an angle elevation of less than 45 degrees from the nozzle 46a (Figs 1-2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the dicing method of the references including Applicant's admitted prior art and Boucher by spraying coolant with a spraying width larger than the width of the dicing saw with the coolant having a pH value from 4 and 6, as taught by Sutherland. This

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is because of the desirability to flood the coolant to the entire width of the dicing saw so that to cool the dicing saw in an effective manner. This is also because of the desirability to deleterious corrosion and prevent adhesion of the residue particles to the aluminum bonding pads.

Furthermore, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made to select the portion of the prior art's range of angle for spraying the coolant from the nozzles to the dicing saw at an angle less than about 45 degrees, as shown by Boucher and Sutherland, which is within the range of applicant's claims, because it has been held to be obvious to select a value in a known range by optimization for the best results, and would be an unpatentable modification, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In Re Aller* 104 USPQ 233,255 (CCPA 1955); *In re Waite* 77 USPQ 586 (CCPA 1948); *In Re Swanson* 56 USPQ 372 (CCPA 1942); *In Re Sola* 25 USPQ 433 (CCPA 1935); and *In Re Dreyfus* 24 USPQ 52 (CCPA 1934).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted prior art in view of Boucher et al (6,354,909) and Sutherland et al (5,461,008), as applied to claims 3,4,6 above, and further of Cook (6,454,190).

The references including Applicant's admitted prior art, Boucher and Sutherland teach a semiconductor device manufacturing method as applied to claims 3,4,6 above, wherein the coolant includes water (Sutherland, Abstract, col 6, lines 27-45; col 1, lines 28-36).

Re claim 5, the references already teaches using water as a coolant, but lack using RO water by passing tap water through an RO (reverse osmosis) film.

However, Cook teaches (at Abstract; col 2, lines 45-65) providing pure RO water by passing tap water through an reverse osmosis (RO) membrane film 38.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to spray the water coolant to the dicing saw of the combined references by passing using passing the tap water through an reverse osmosis film as taught by Cook. This is because of the desirability to have high quality pure RO water as a coolant for cooling the dicing saw and the substrate and for removing residue particles, wherein clogging of the nozzle is also reduced as the pure RO water having very low mineral content.

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Response to Amendment

**** Applicant's arguments filed September 29, 2005 with respect to pending claims have been considered but are moot in view of the new ground(s) of rejection.**

Applicant's present specification teaches "the cutting process could be performed while maintaining the temperature of the cutting portion 40 below 150°C, which was the softening temperature of the epoxy resin layers, the layer with the lowest softening temperature".

Herein, Boucher teaches to perform a cooling step at a coolant temperature of less than about 50 degrees Fahrenheit (i.e. less than 10 degrees Celsius), which coolant temperature, as taught by Boucher, is very low, and lower than the softening temperature of the insulating resin as taught by Applicant's admitted prior art.

Rejections are outstanding and maintained.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

***** Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272- 1847. The examiner can normally be reached on M-F: 8:30 Am to 5:00 Pm.**

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number is (571) 273-8300

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

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Michael Trinh
Primary Examiner